BuBoard – The Digital Bulletin Board

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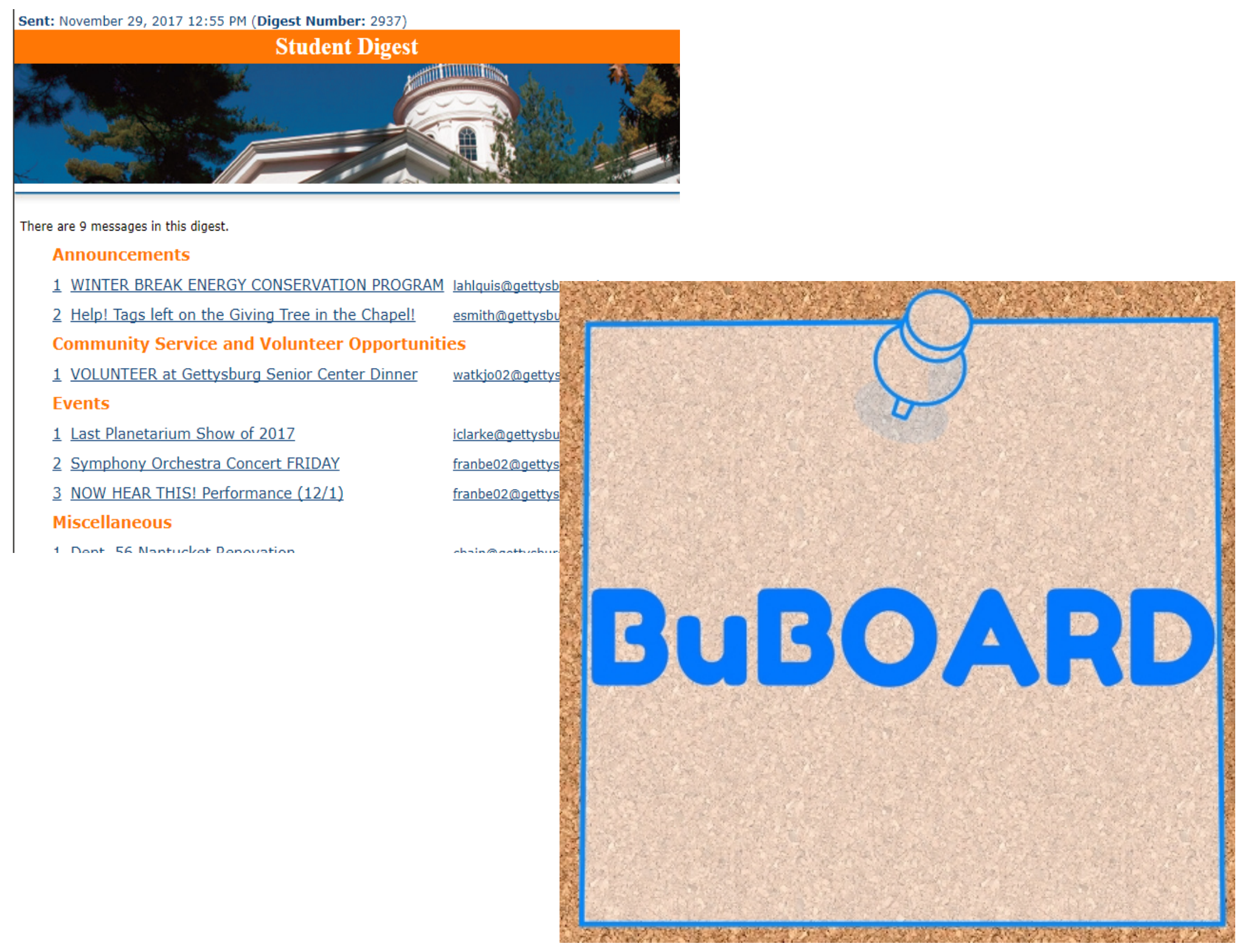
Background

On the Gettysburg College campus, an automated email newsletter, known as 'The Digest', is the official source of information between the college administration and the student body. As the number of events on campus and in the Digest grew, it became an unwieldy and diluted source of information, and use among average students tapered off. As part of our senior project proposal, we were approached by two students who were venturing to replace the Digest. Karan Shrestha and Ethan Murphy had conceptualized a system that allows students to rapidly share information among themselves, and between campus administration. Taking the form of a digital bulletin board, where students can post, view, and subscribe to campus events, the system they envisioned would be more closely tailored to the needs of students. We took on the challenge of creating this program, in the hopes that it may improve the Gettysburg College campus communication system, and find some use in other campuses as well.

The result of our semester-long endeavors, we are making the resulting BuBoard Digital Bulletin Board software freely available.

BuBoard: A Communication System

The original Gettysburg College 'Digest' system took on a number of roles that we wish to reproduce and augment using the new capabilities of a web-based system. Partly a bulletin board and partly a classifieds page, BuBoard is ready to fill in these functions in a user friendly manner. Using 'cards' that users can 'pin' to a virtual bulletin board, it is easy to share and discover new content happening on a local scale. To approach the breadth of announcements and notifications, we developed a sophisticated sorting and subscription solution to display only relevant content to the user. We took pains to not have the system be overwhelming, like the Digest, and to make it easy for all students to use. We also ensured that deploying the software is easy and secure, so that other campuses or departments can onboard their students as BuBoard expands.



Sent: November 29, 2017 12:55 PM (**Digest Number:** 2937)

Student Digest

There are 9 messages in this digest.

Announcements

1 WINTER BREAK ENERGY CONSERVATION PROGRAM lahlquis@gettysb
2 Help! Tags left on the Giving Tree in the Chapel! esmith@gettysbu

Community Service and Volunteer Opportunities

1 VOLUNTEER at Gettysburg Senior Center Dinner watkjo02@gettys

Events

1 Last Planetarium Show of 2017 iclarke@gettysbu
2 Symphony Orchestra Concert FRIDAY franbe02@gettys
3 NOW HEAR THIS! Performance (12/1) franbe02@gettys

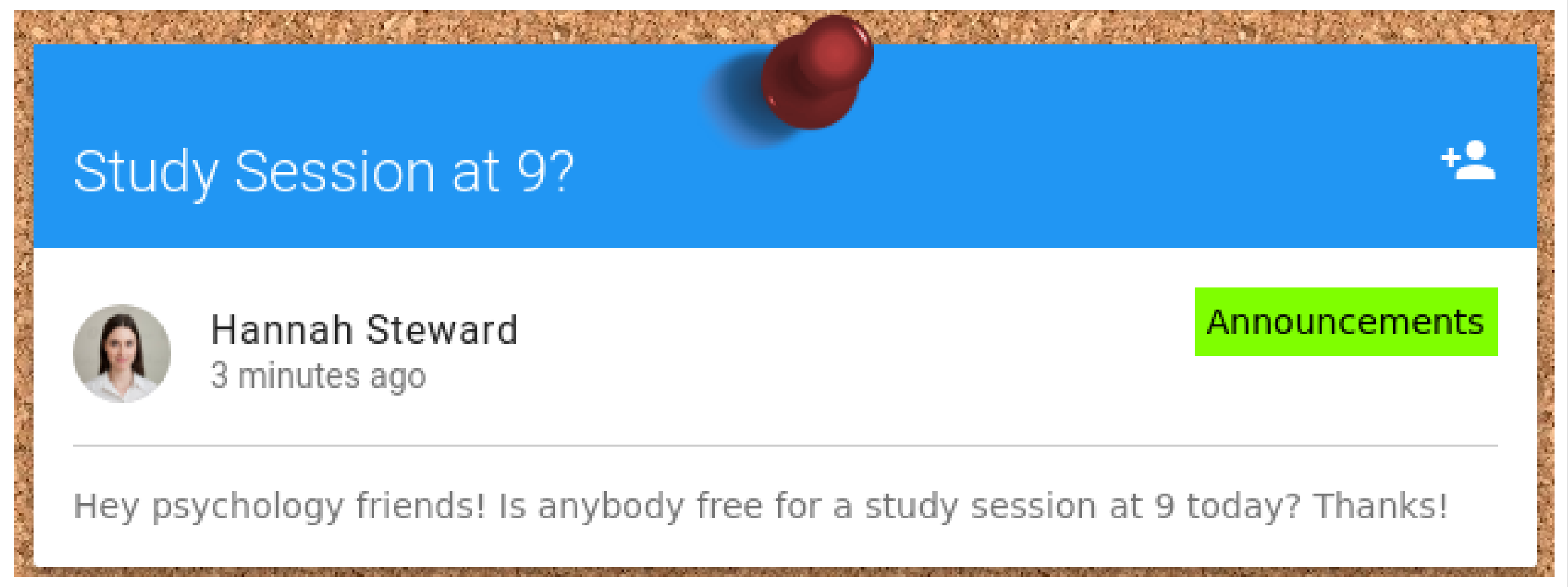
Miscellaneous

1 Dept. 56 Nantucket Renovation

Features

The BuBoard system incorporates many different features and aspects of design in order to provide a seamless experience. Discovering what is happening on campus around you, planning for future events, and sharing your information to your subscribers is made easy and effortless using the physical bulletin board metaphor.

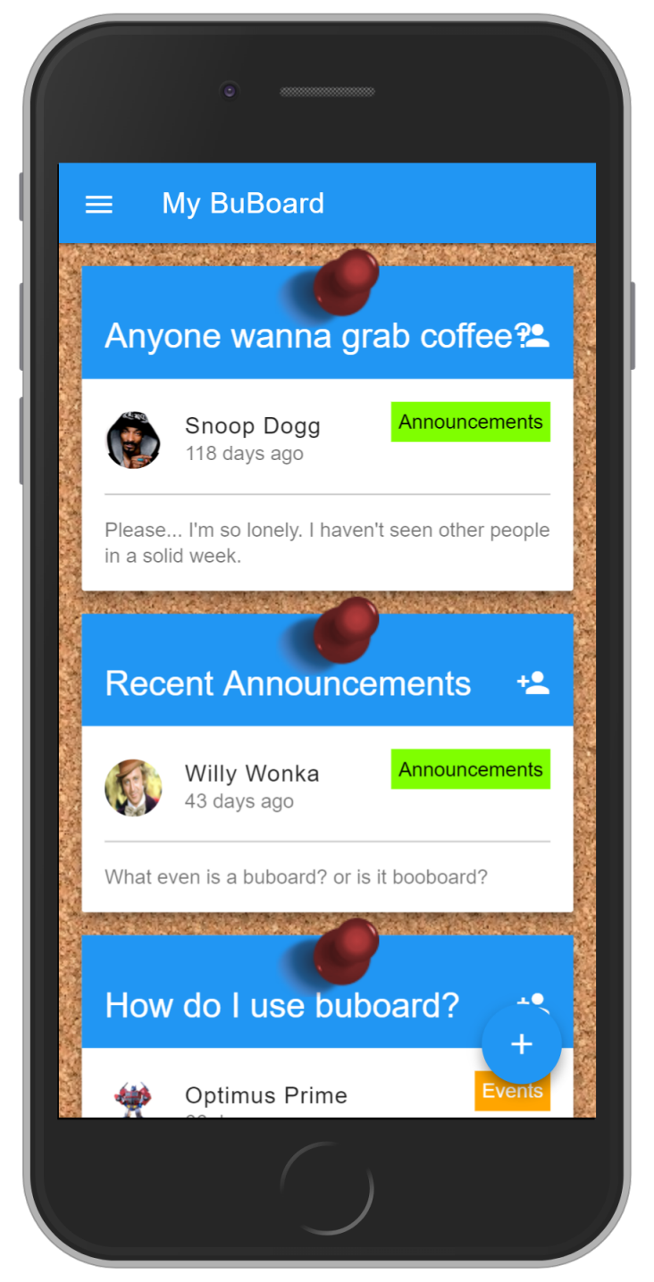
- **Posts**
  All information on BuBoard is conveyed through posts on 'BuBoard Cards'. Everyone can pin a card to the bulletin board and they are widely distributed and easy to discover.
- **Tags**
  Every card is given a color-coded tag. By earmarking a post as 'academic', 'events', 'announcements', or another user-defined category, the cards become extremely easy to find and sort. Users can get rid of information they don't need and quickly find the information relevant to them.
- **Subscriptions**
  Subscriptions allow users to mark what is important to them and narrow down their feed to sources they care about. This is the main distinguishing feature from the system we are working to replace. We hope that by allowing a user to taper down the noise, the software becomes more usable, even in the face of a large number of users.
- **Verified Accounts**
  Official accounts are automatically subscribed to and securely verified in order to provide easy access to the most important content, such as posts from college administration or public safety.
- **Text Notifications**
  By leveraging user subscriptions and tuning to their interests, the system can alert users to unread posts that they care about and would not want to miss.



Study Session at 9?

Hannah Steward
3 minutes ago

Hey psychology friends! Is anybody free for a study session at 9 today? Thanks!



My BuBoard

Anyone wanna grab coffee?

Snoop Dogg
118 days ago

Please... I'm so lonely. I haven't seen other people in a solid week.

Recent Announcements

Willy Wonka
43 days ago

What even is a buboard? or is it booboard?

How do I use buboard?

Optimus Prime

- **Ready for all devices**
  The whole application is optimized for small screens, mobile devices, slow network connections, and touch screens. This was crucial for our project as we anticipate our user base to be primarily on mobile devices.

Technical Background and Information

It was important to our clients that this application be accessible through the web to allow users on any platform to access BuBoard. This necessitated using web technologies such as HTML, CSS, and JS. After evaluating a number of environments and languages, we made decisions on our technology stack that would facilitate our development process throughout the semester. The technology stack includes technologies and languages that execute both on the application's server and on the client's machine.

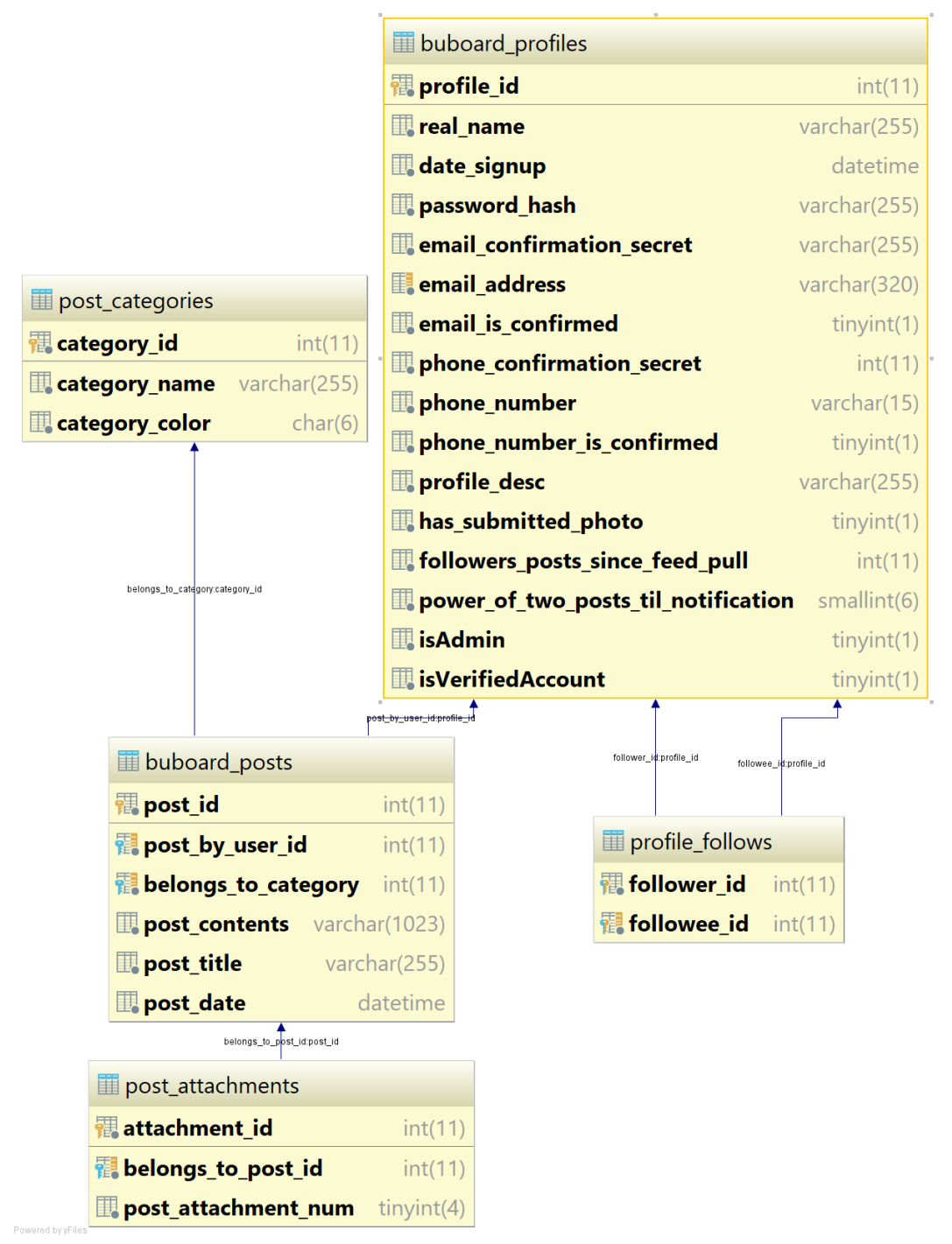
Our server-side technology stack included Docker for containerization and the LAMP stack (Linux, Apache, MySQL, and PHP) as our environment. Docker is a new technology that our group wanted to experiment with for this project which allowed us to rapidly create development environments as we needed them. This allowed us to iterate quickly and work independently without the need for creating a central server. By leveraging features of the Linux kernel, Docker creates on-demand and reproducible self-contained machines, without the overhead of a completely virtualized machine. Applications that run in the Docker container are only exposed to an isolated and purpose-built filesystem. By executing applications on the host machine's kernel, and by sandboxing the filesystem and networking into a container, it allows secure environments to execute independently of each other with little overhead.

The LAMP stack is an extremely popular environment for developing web applications and is considered an industry standard. We brought the LAMP stack into a docker container to realize the benefits of both environments simultaneously. The four parts of the LAMP stack are each software packages with their own functions. GNU / Linux is an operating system; Apache is the HTTP server; MySQL is our relational database management engine; PHP is a scripting language for server-side web development.

Our client-side technology stack, which is the code that executes in the browser and is responsible for the front end of the application, includes a design library named Material Design Lite (MDL), made available by Google, jQuery which is a framework for simplifying common JavaScript actions, and finally, vue.js is a JavaScript framework that is based on reactivity and allows easy control over page elements.

Development Process

At the beginning of the semester we had to identify the most difficult parts of the project and determine how they would be implemented. We also had to design the flow of the application, while determining the appropriate database structure to hold the information (pictured below).



buboard_profiles
profile_id int(11)
real_name varchar(255)
date_signup datetime
password_hash varchar(255)
email_confirmation_secret varchar(255)
email_address varchar(320)
email_is_confirmed tinyint(1)
phone_confirmation_secret int(11)
phone_number varchar(15)
phone_number_is_confirmed tinyint(1)
profile_desc varchar(255)
has_submitted_photo tinyint(1)
followers_posts_since_feed_pull int(11)
power_of_two_posts_til_notification smallint(6)
isAdmin tinyint(1)
isVerifiedAccount tinyint(1)
post_categories
category_id int(11)
category_name varchar(255)
category_color char(6)
buboard_posts
post_id int(11)
post_by_user_id int(11)
belongs_to_category int(11)
post_contents varchar(1023)
post_title varchar(255)
post_date datetime
profile_follows
follower_id int(11)
followee_id int(11)
post_attachments
attachment_id int(11)
belongs_to_post_id int(11)
post_attachment_num tinyint(4)
belongs_to_category:category_id
post_by_user_id:profile_id
follower_id:profile_id
followee_id:profile_id
belongs_to_post_id:post_id
Powered by yFiles

We established a division of labor between our team members and determined which features would be prioritized and who would be responsible for them. We also practiced a weekly version of Scrum to keep track of our progress. We identified the largest parts of the application's development time as authentication, sorting, and usability.

Because of their complexity, we knew we had to plan these sections out accordingly. Our task management and bug tracking was done through an online coordination tool named Trello, which allowed us to share progress in real time. We also used Git as our version control system, and we configured it to notify us whenever our teammates pushed changes, allowing us to always be aware of the state of our project.

Future Work

Our client's motivations are entrepreneurial and they hope to soon release BuBoard for several focus groups of Gettysburg College students. If our original assumption that this is a viable replacement for the Digest is validated, we hope to see BuBoard more widely deployed to the campus community and perhaps deployed to other campuses as well. If time had allowed, we would have added a mobile notification subsystem, further refinements to the user interface, and a system for measuring and recording user engagement metrics.

Conclusion and Considerations

While this semester was challenging and demanding, it was also rewarding to complete this project. We were proud to be able to complete every requirement we documented within a semester. This experience has allowed us to grow as developers, students, and professionals. Working on a larger project academically than we have had in the past allowed us to apply the software engineering skills we have learned throughout our academic career.

We would like to thank Dr. Clifton Presser and Dr. Rod Tosten for their guidance and supervision throughout our project, and our clients Karan Shrestha and Ethan Murphy for their patience and continued interest in the project, as well as the opportunity to participate in this endeavor. We also give special thanks to the Gettysburg College Department of Computer Science and to Gettysburg College.